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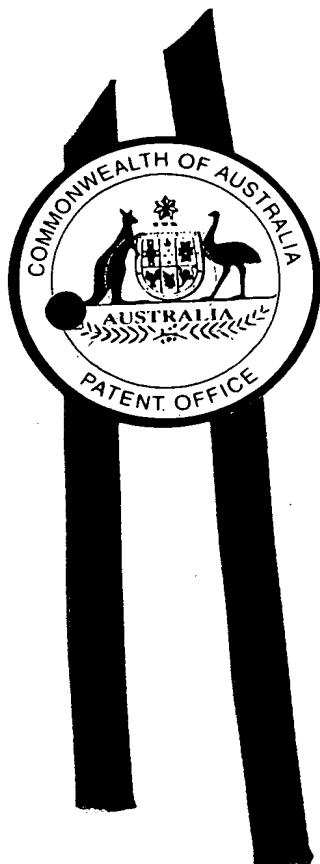
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I, KIM MARSHALL, MANAGER EXAMINATION SUPPORT AND SALES,
hereby certify that the annexed is a true copy of the Provisional specification in
connection with Application No. PP 3111 for a patent by PETER ALAN SMITH
filed on 18 February 1998.

PRIORITY DOCUMENT

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WITNESS my hand this Seventeenth
day of March 1999

KIM MARSHALL
MANAGER EXAMINATION SUPPORT AND
SALES

AUSTRALIA
Patents Act 1990

ORIGINAL
COMPLETE SPECIFICATION
PETTY PATENT

Invention Title: Chair Incorporating Air Cushions

The following statement is a full description of this invention, including the best method of performing it known to me:

GH REF: P16117-X:RW/LN

This invention relates to a chair construction that incorporates air-containing cushions. The invention has been developed in the context of so-called nursing chairs and is hereinafter described in this context. However, it
5 will be understood that the invention does have broader application, for example to lounge chairs and office chairs. It should also be understood that the term "chairs" as used in this specification is to be construed as including lounges, settees and such other seating items as have seat
10 and backrest portions.

Numerous attempts have been made to create chairs that provide appropriate support and comfort for invalids and aged persons who are confined to the chairs for protracted periods. Those persons must be supported in such a way that
15 their body mass is distributed more-or-less evenly over the area of supporting cushions, so as to avoid traumatic pressure points. This means that supporting cushions must function to conform with the shape of seated persons and,
whilst this might be made possible if chairs were to be
20 tailored to the requirements of individual persons, this clearly is not practicable. The simple fact is that any given chair might be used by a number of different persons having different physical sizes, shapes and body masses.

Attempts have been made to accommodate the special
25 needs of aged and invalid persons by the development of water chairs. These have taken various forms and the most successful of them has been constructed with a number of separate bladder-like bags, each of which is partially filled with water. The bags are fitted together and located
30 below upholstery material, and the water within each bag is displaceable to accommodate body shapes of persons who are supported by the chairs.

The water chairs have proved to be very successful in nursing homes and other places where aged persons and long
35 term invalids are accommodated. However, the chairs have two problems; they have a potential to leak water with damage to and aging of the water-containing bags and, perhaps more importantly, they are extremely heavy due to

the weight of water (typically 20 to 30 kilograms) that is required to provide full support for a range of differently sized people. The latter problem requires that the chairs be mounted on large size wheels, not just casters or glides, and even then the chairs are found by nursing personnel to be difficult to manoeuvre.

The chair which is the subject of the present invention has been developed in an attempt to achieve a substantial weight reduction whilst retaining the recognised benefits of water chairs, and this has led the inventor naturally to consider air as an alternative to water.

So-called blow-up air beds have long been used for recreational purposes and inflatable cushions are used regularly by travellers in aircraft and road vehicles to provide seat cushioning and neck support. However, all of these known inflatable beds and cushions provide hard, unyielding support when they are fully inflated and, even if partially inflated, are not adaptable to chair constructions.

The present invention seeks to provide an air cushioning arrangement that is appropriate to chairs and, to this end, the invention may be defined broadly as providing a chair which has a seat portion and a backrest portion. The chair includes seat and backrest support structures, at least one air-containing cushion secured to the seat support structure, at least one air-containing cushion secured to the backrest support structure, and an upholstery material covering the air-containing cushions. Each cushion comprises a bladder which is formed from a pliable, gas impermeable material and each bladder is charged with air in an amount not greater than 50% of the maximum contained volume of the bladder, whereby the air may freely be displaced within the bladder and shaping may be imparted to the bladder to complement that of a person who occupies the chair.

Each bladder preferably is charged with air in an amount not greater than 25% of the maximum contained volume of the bladder. This may be achieved in practise by locating the

bladder within a volume restricting frame during fabrication of the chair and by charging the bladder with air in an amount sufficient to inflate the bladder only to the extent permitted by the frame, that is to a pressure not
5 significantly above atmospherical pressure. The bladder will then be closed against inflow or outflow of air, and this sealing may be permanent or temporary. That is, although the bladder may be sealed closed in a permanent manner, it is preferred that the bladder be provided with a
10 valve through which air may be admitted to or bled from the bladder as and when required.

The upholstery material that is employed to cover the cushions may be fitted to the chair as loosely as aesthetic or fashion constraints permit. However, it is important
15 that the upholstery material should not be so tightly fitted as to limit or constrain shaping that is imparted to the bladder by a seated person. That is, the bladder and the upholstery material covering must move together to assume a
shape that complements that of the supported person.

20 The seat portion of the chair will normally support a single cushion but the backrest portion may be fitted with one or more cushions, depending upon the size of the chair and its intended function.

Expanded foam sheet material may be located below
25 and/or over one or more of the gas containing cushions for the purpose of providing additional load support to a seated person or, in the case of the sheet material being placed between the gas containing cushions and the upholstery material, for the purpose of imparting a smooth shape or
30 contour to the chair. Also, when the expanded foam sheet material is located both below and above the cushions, that which is located below the cushions preferably is more dense than that which is located above the cushions.

The upholstery material may comprise leather, fabric or
35 a plastic sheet material, depending upon the intended use of the chair. It is preferred in respect of nursing chairs that are intended for use with persons who may be incontinent that the upholstery material be composed of a

plastic sheet material.

Also, when in the form of a nursing chair the backrest support structure is preferably pivotably mounted with respect to the seat support structure. Also, the seat support structure is preferable mounted to or integrated with a support base which, in turn, is preferably carried by wheels or rollers.

Furthermore, when the chair is in the form of a nursing chair, it preferably comprises a leg support portion that is pivotably mounted with respect to the seat portion and, in such case, an air-containing cushion will be mounted to the leg rest portion.

The chair may be fabricated by using timber framing, but the chair preferably is formed with a metal frame which is fitted with reinforced plastic sheet material to form the seat and backrest support structures and to carry the cushions.

The air-containing cushions may be removably secured to the seat and backrest support structures by way of self-securing fastening material such as that which is sold under the Velcro trade mark. Also, the upholstery material may itself be secured in place by use of similar self-securing fastening material.

The invention will be more fully understood from the following description of a relatively simple example of a metal-framed nursing chair that has been developed to incorporate the invention. The description is provided with reference to the accompanying (largely diagrammatic) line drawings wherein:

Figure 1 shows an exploded perspective view of the metal frame of the nursing chair with all cushions and upholstering material removed from the chair.

Figure 2 shows a perspective view of one corner of the chair as seen in the direction of arrow 2 in Figure 1, the view showing a portion of padding material and seat support material.

Figure 3 shows, in perspective, a partial view of the chair when fitted with water cushions.

Figure 4 shows a side view of the chair when fitted with cushions, expanded foam sheet material and upholstering material.

5 Figure 5 shows a view similar to Figure 4 but when the chair is accommodating a seated person.

As illustrated, in particular in Figures 3 to 5, the chair includes a seat portion 10, a backrest portion 11 and a leg support portion 12. The complete chair is built upon an integral tubular metal frame 13 which is shown in
10 Figure 1.

The frame has a support base 14 which is mounted to floor engaging wheels 15. Two brackets 16 are welded to tubular side rails 17 of the support base and provide bearings 18 for a seat support frame structure 19. The seat
15 support frame structure 19 is pivotably mounted to the support base and telescopic gas struts (not shown) interconnect the support base and the seat support frame structure 19 to provide for controlled tilting of the whole

seat portion 10 relative to the support base 14.

20 The seat support frame structure 19 has upper and lower side rails 20 and 21, and cross rails 22. The upper side rails form the structural parts of armrests of the chair and, for this purpose, the side rails carry expanded foam plastic padding material 23 which is shown in part in Figure
25 2. Although not shown throughout the drawings, similar foam plastic sheet material is secured to other parts of the structure and is overlaid with upholstering material (not shown) in the finished chair.

A fibre reinforced plastic sheet material 24 is
30 provided to extend between the lower side rails 21 of the seat support frame structure for carrying seat cushioning material (referred to in more detail later). A similar fibre reinforced plastic sheet material 25 (a portion of which is shown in Figure 1) is provided on a backrest frame
35 portion 26 for supporting backrest cushioning.

The seat support frame structure 19 is provided with pivot bearings 27 to match the bearings 19 on the support base 14. Similar pivot bearings 28 and 29 are provided on

the seat support frame structure 19 for pivotably mounting the backrest frame portion 26 and a leg support frame portion 30.

5 The leg support frame portion 30 comprises a generally rectangular frame that, like the rest of the structure, is formed from tubular metal, and it is pivotably mounted to the seat support frame structure 19 by way of pivot bearings 31. The leg support frame portion is fitted with expanded
10 foam type plastic material sheet 32 for carrying leg support cushioning.

The backrest frame portion 26 is formed predominantly as a rectangular frame but it includes a lower angled portion which carries pivot bearings 33. It also include
15 triangular-shape side portions 34 which are fitted with expanded foam padding material (not shown) to form side wings of the chair when finally upholstered.

The backrest frame portion 26 of the chair is connected to the seat support frame portion 19 by telescopic gas
20 struts (not shown), so as to permit pivotal movement of the backrest of the chair relative to the seat portion of the chair.

Thus, with the chair structure as described thus far each of the seat portion, backrest portion and leg support portion may be pivoted one relative to the other so that the
25 chair may be placed in any disposition ranging from a bed through to an upright chair. Also, the entire structure may be pivoted about the support base 14 to facilitate entry and exit of invalid persons from the chair.

As shown in Figures 3 and 4, a lower cushion 35 that is
30 formed from expanded foam sheet material, is laid on and secured to the supporting sheet material 24. A single air cushion 36 is carried by the lower cushion material 34. Also, two air cushions 37 and 38 are secured to the backrest sheet material 25, and a single air cushion 39 is secured to
35 the expanded foam sheet material 32 that is carried by the leg support frame portion of the chair.

Each of the air cushions 36 to 39 is formed from a bladder having side walls as well as top and bottom walls,

such that the cushion would assume a generally oblong shape if charged with air in an amount equal to the maximum contained volume of the bladder. The bladders are fabricated from pliant air impermeable plastic sheet material having a thickness within the range 0.25 to 1.00 millimetre, and all seams of the bladder are closed by welding or gluing to effect complete sealing. Valves 40 are provided in one side wall of each bladder to enable air to be delivered to and bled from the cushion which is constituted by the bladder. As indicated previously, it is important that the cushions be charged with air in an amount not greater than 50% of the maximum contained volume of the bladder and, more usually, in an amount between 20% to 25% of the maximum contained volume of the bladder. The actual amount of air will be determined in any given case by the position of the cushion, the amount of foam plastic sheet material cushioning that is used in conjunction with the cushions and the resiliency of the upholstering material which is used to overlay the cushions.

The air containing cushions are fitted closely together, as indicated in Figure 4, in order that they might be caused to meld together when adapting to the shape of a seated person, as indicated in Figure 5. The upper backrest cushion 38 is extended over (ie, wrapped around) the top of the backrest frame portion 26 to provide air cushioned support for the neck and head of a seated person. Similarly, the leg support cushion 39 is wrapped around the front and rear sides of the leg support frame portion 30.

Each of the bladders is removably secured by self-securing fastening material such as that, as indicated previously, is sold under the Velcro trade mark.

As indicated in Figure 4, a continuous length of relatively soft, expanded foam plastic sheet material 41 is laid along the full length and height of the chair, to cover the leg support portion, the seat portion and the backrest portion of the chair. However, the use of this material is optional and may not be necessary with some upholstering materials.

Upholstering material 42 is used to cover the entire chair and, for convenience, this material may also be held in place by self-securing fastening material.

- 5 Variations and modifications may be made in respect of the invention as above described and defined in the following claims:
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The claims defining the invention are as follows:

1. A chair which has a seat portion and a backrest portion, the chair including seat and backrest support structures, at least one air-containing cushion secured to
5 the seat support structure, at least one air-containing cushion secured to the backrest support structure, and an upholstery material covering the air-containing cushions, each cushion comprising a bladder which is formed from a pliable, gas impermeable material and each bladder being
10 charged with air in an amount not greater than 50% of the maximum contained volume of the bladder, whereby the air may freely be displaced within the bladder and shaping may be imparted to the bladder to complement that of a person who occupies the chair.
 - 15 2. The chair as claimed in claim 1 wherein a single air-containing cushion is secured to the seat support structure and at least two air-containing cushions are secured to the backrest support structure.
-
- 20 3. The chair as claimed in claim 1 or claim 2 and including a leg support portion pivotably mounted to the seat support structure.
 4. The chair as claimed in any one of claims 1 to 3 wherein the seat support structure is pivotably mounted to a support base and wherein the backrest support structure is
25 pivotably mounted with respect to the seat support structure.
 5. The chair as shown in the accompanying drawings and substantially as hereinbefore described with reference thereto.

30

Dated this 16th day of February 1998

PETER ALAN SMITH

By his Patent Attorneys

GRIFFITH HACK

35

ABSTRACT

A chair which has a seat portion (10), a backrest portion (11) and a seat support portion (12). A single air-
5 containing cushion (36) is secured to a seat support structure (19) of the seat portion (10), and two air-containing cushions are secured to a backrest support structure (26) of the backrest portion (11). An upholstery material (42) covers the air-containing cushions. Each
10 cushion comprises a bladder which is formed from a pliable, gas impermeable material and each bladder is charged with air in an amount not greater than 50% of the maximum contained volume of the bladder, whereby the air may freely be displaced within the bladder and shaping may be imparted
15 to the bladder to complement that of a person who occupies the chair.

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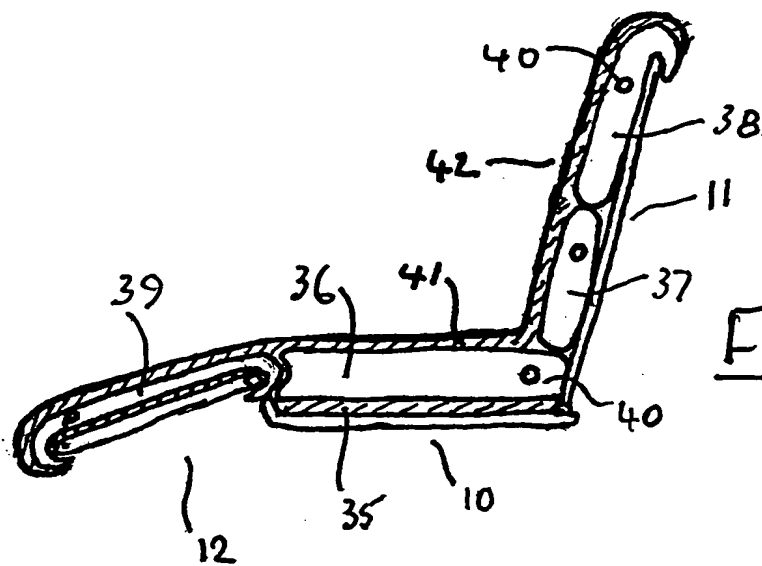


FIG. 4

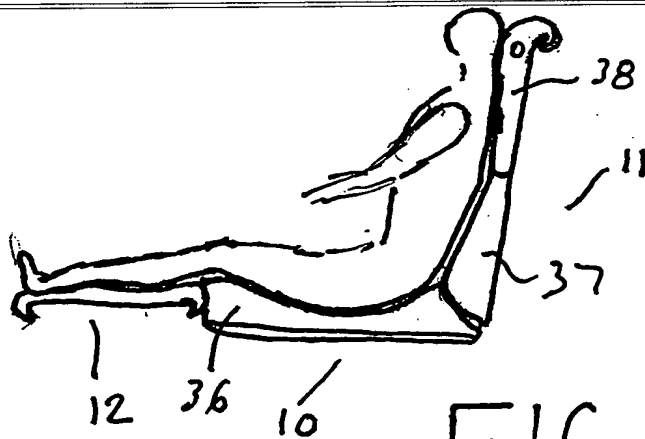


FIG. 5

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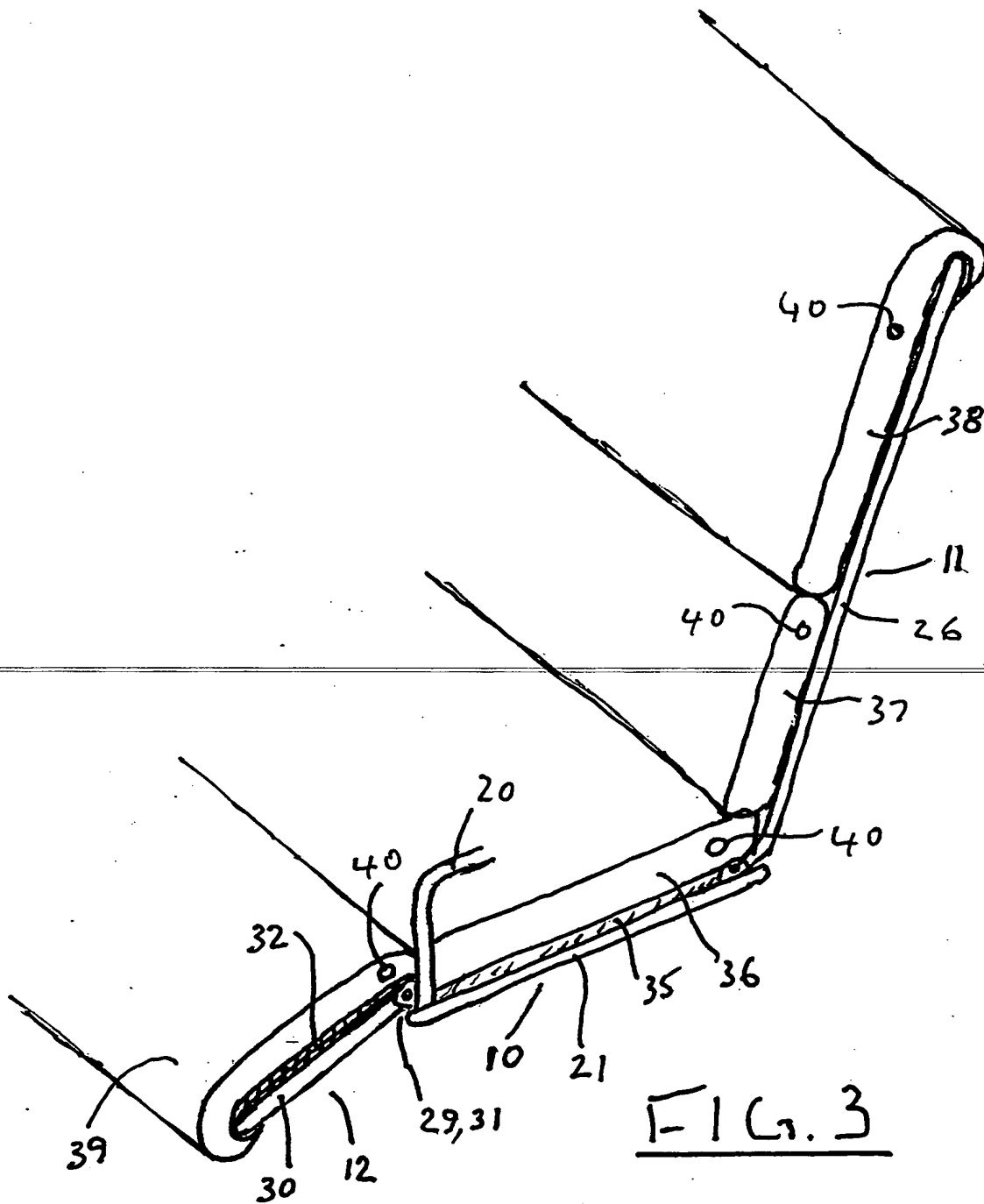


FIG. 3

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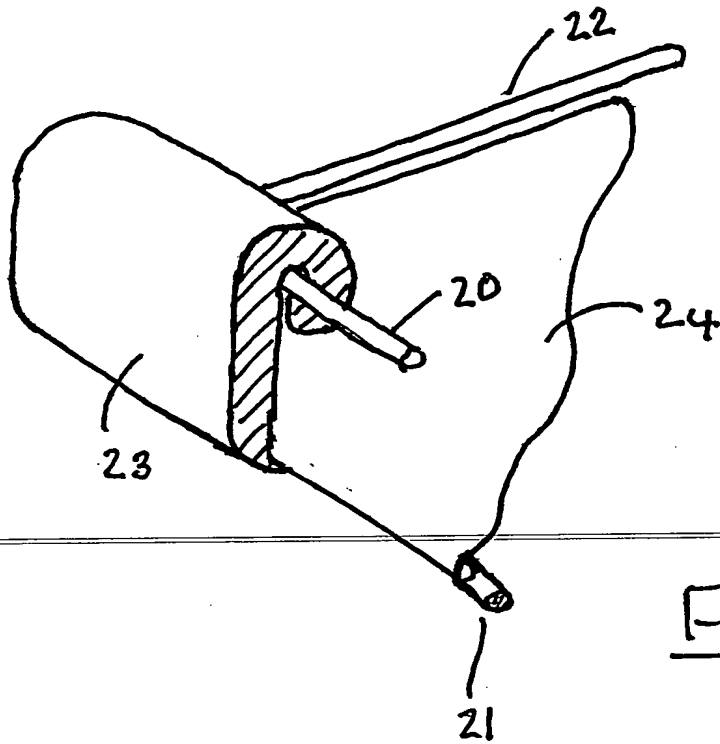


FIG. 2

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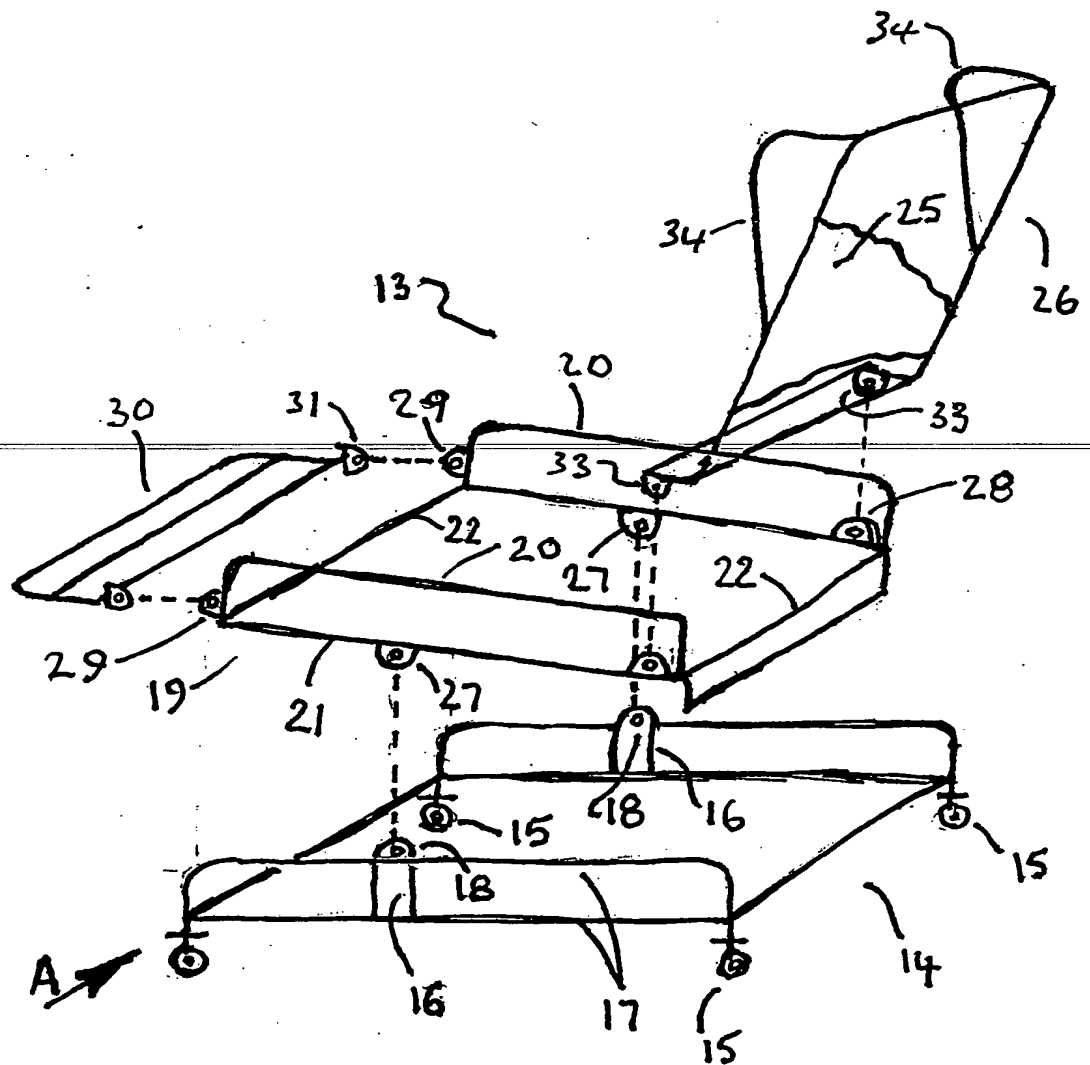


FIG. 1